

Epidemiology and Rapid Indicator Studies To Improve Our Beach Water Quality Monitoring Program

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Beach Monitoring is on the Verge of Big Changes

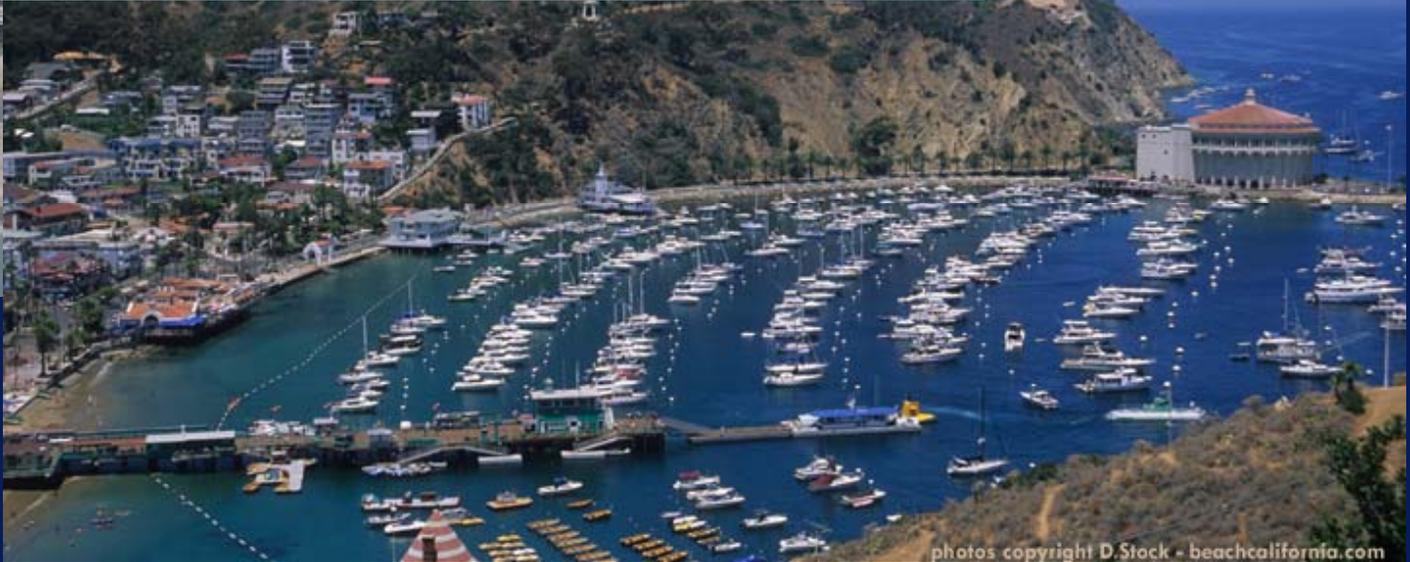
- **Beaches have been monitored the same way for decades**
 - Limited to growth in cultures
- **Existing methods are slow**
- **Existing methods are nonspecific**
- **New technology provides opportunities for improvement**
 - genetic based measurements

Studies Necessary To Support Changes In Beach Monitoring

- **Method performance evaluation studies**
 - Repeatable, sensitive, accurate
- **Transferable to local agencies**
- **Swimming related epidemiology**
 - Relationship between health effects and concentrations

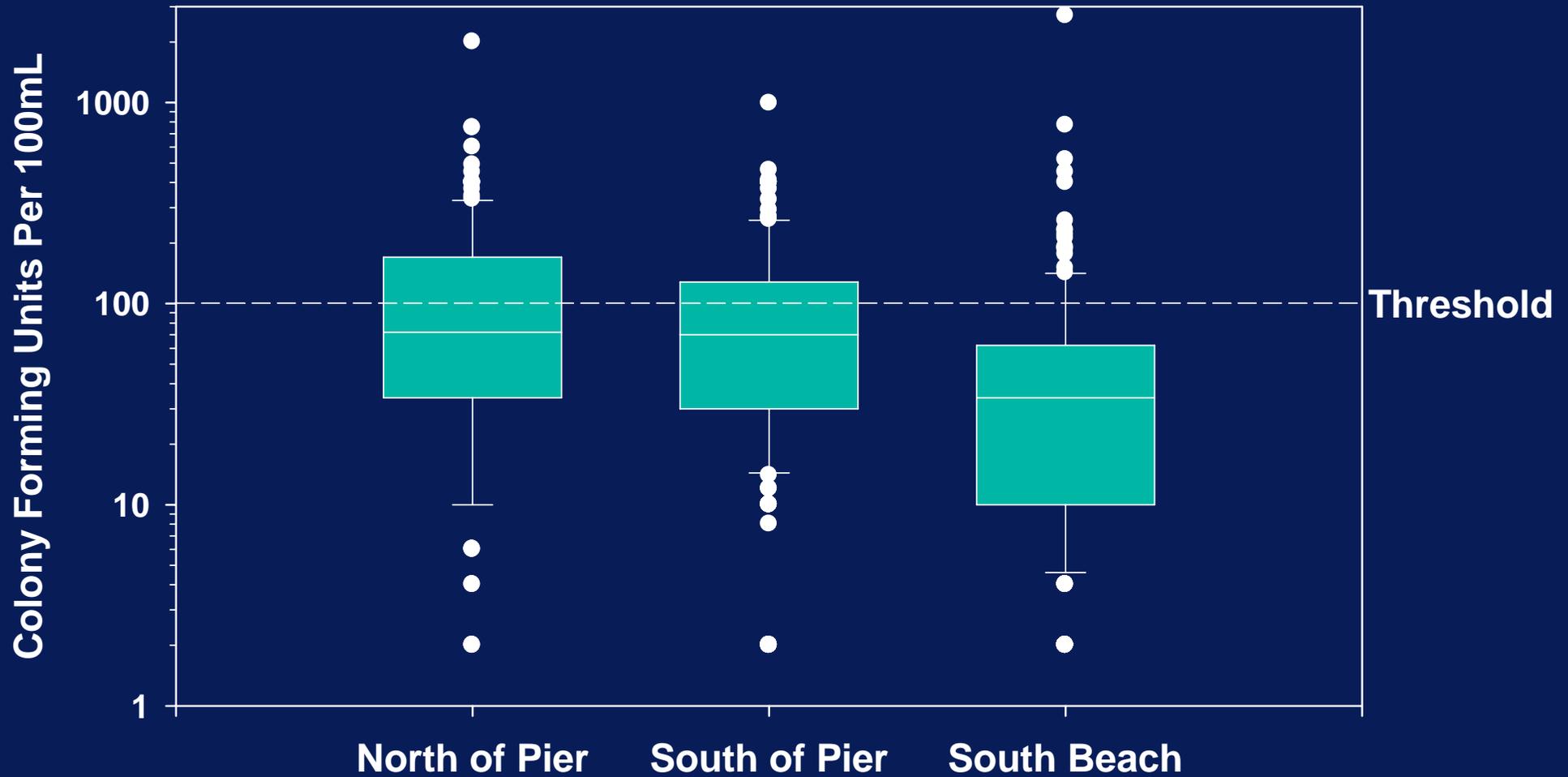
California Epidemiology Studies

- **Three beaches with different types of fecal sources**
 - all nonpoint sources
- **Over thirty different indicators of fecal pollution**
 - Two dozen of the best researchers in the nation
- **More than 30,000 swimmers**
 - nearly 20 different symptoms



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Enterococcus Concentrations At Avalon Beach, Summer 2007



TRADITIONAL

Enterococcus Idexx (2)

Enterococcus MF

Fecal Coliform MF

Total Coliform MF

RAPID

Enterococcus QPCR (2)

Enterococcus TMA

E. coli QPCR

MICROBIAL SOURCE TRACKING

Enterococcus esp gene (2)

E. Coli raptor gene

Bacteroides sp.

Bacteroides human marker (2)

B. thetaiotamicron (2)

Legionella

Methanogens

Methanobrevibacter smithii (2)

VIRUS

F+ and Somatic Coliphage

F+ and Somatic Coliphage ELISA

Adenovirus

Enterovirus

Norovirus (2)

Hepatitis A virus

Polyoma virus

COMMUNITY PROFILING

Enterococcus

Bacteroides thetaiotamicron

Helicobacter pylori

Campylobacter jejuni

Clostridium perfringens

Salmonella enteritica

Shigella dysenteriae

Shigella flexneri

Shigella boydii

GASTROINTESTINAL

Nausea

Vomiting

Diarrhea

Cramps

Highly Credible Gastrointestinal

Illness 1 (HCGI-1)

HCGI-2

DERMATOLOGICAL

Skin rash

Scrapes

RESPIRATORY

Cough

Cough with phlegm

nasal congestion

sore throat

Significant respiratory

disease (SRD)

NON-SPECIFIC

Fever

Chills

Earache

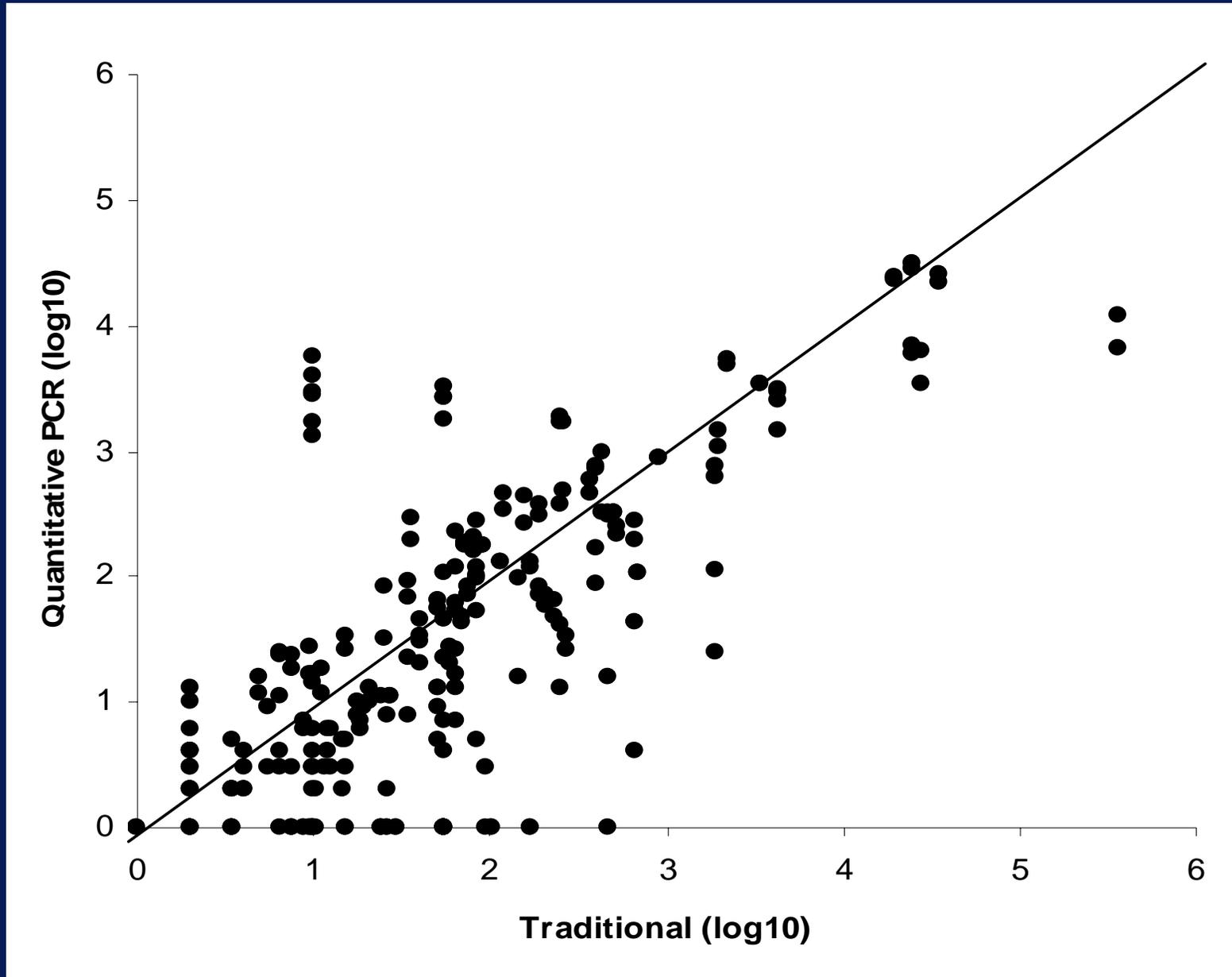
Ear discharge

Eye irritation

California Is Way Ahead on Rapid Methods

- **Started exploring rapid methods in 2001**
 - Adopted from other applications
- **Close to equivalency with existing methods**
 - Conducted two evaluation studies
- **Techniques can be conducted by routine laboratories**

New vs. Traditional Technology for Enterococcus (per 100 mL)



Outreach and Involvement

- **Diverse study team**
- **Federal, State, and local partners**
- **Internationally renowned scientific review team**
- **Managers through the Beach Water Quality Work Group**
 - **County Health, NPDES, RWQCB**